Knowledge and Use of Folic Acid by Amish Women Residing in the Midwest.

An Honors Thesis (HONRS 499)

by

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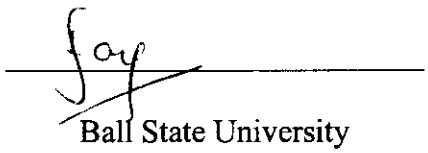

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THESIS ABSTRACT

Thesis: Knowledge and Use of Folic Acid by Amish Women in the Midwest.

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The purpose of this study was to investigate the nutrition knowledge of folic acid among Amish women (who were pregnant or planning to be pregnant) residing in the Mid-west. Forty-five women from the Kidron, Ohio and Berne, Indiana areas completed a fifteen, question survey. Of the subjects, 93% were between the ages of 21-40 years and 94% had an eighth grade education. Number of children per family ranged from 0-9. Seventy percent prefered to receive information about vitamins from their doctor during pregnancy. Sixty-two percent of the Amish women had heard, read about, or taken folic acid. From the women who had heard of folic acid, 54% had heard about it from family or friends and another 31% learned from their doctor. An astounding 77% knew that the primary benefit of taking folate on pregnancy was to decrease the risk of birth defects. Just over half of these women knew the best time to start taking folate for pregnancy was actually before pregnancy occurs. Seventy-eight percent were taking prenatal vitamins 7 times per week, but only 15% were taking folic acid supplements other than their prenatal vitamins. Knowledge on good food sources of folate was lower than other values. Thirty-two percent correctly answered that orange juice was a good source. However, 7% indicated that beans and breads were good sources of folic acid. Four percent thought organ meats (liver/kidney) were excellent sources of folic acid. Unfortunately, 21%

thought cabbage was a good source of folate. Of the women who had heard about folic acid, only 41% had taken folate during a previous pregnancy. Forty-four percent had started taking folate on the advice of family or friends. Forty-three percent of the women had began taking folic acid for their current pregnancy when they were first diagnosed and another 43% started during the pregnancy, but not at the start. Only 14% had taken folic acid while trying to become pregnant. The investigator of this study, feels that in-spite of their minimal nutrition education the Amish women had a high level of knowledge about folic acid. However, for this pilot study, it appears that although Amish women have the knowledge they are unable to apply this information.

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CHAPTER I

INTRODUCTION

In this exciting age of new scientific discoveries, the human race is finding extensive ways to maintain and prolong life and health. Everyday more and more people benefit from increased knowledge of our surroundings and ourselves. In recent years, there has been a shift in the health care area from focusing on the treatment of illness to the prevention. Nutrition and diet have been found to play a vital role in health. Whether it is maintenance or prevention, adequate nutrition affects the body in multiple aspects.

One such discovery, was the link between folate and certain birth defects. Neural tube defects (NTD) can be a devastating birth defect. NTD consist of the conditions spina bifida, anencephaly, and encephalocele which may cause severe disabilities or even death. (1) They are some of the most common and severe birth defects. (2) They occur in about 1 out of 1,000 births in the United States, which comes to around 4,000 affected pregnancies each year. (3)

Folate is a B vitamin that covers folic acid and reduced polyglutant folates. Folic acid is the monoglutamate form of the vitamin that is used in fortified foods and supplements. (1) The scientific name for folic acid is pteroylmonoglutamic acid. Other folates are found naturally in foods such as green leafy vegetables. (2)

Folic acid intake needs to begin at least four weeks before conception to help with the prevention of an NTD. (3) Both genetic and nutritional factors affect red-cell folate levels. (4) It is believed that folic acid helps by correcting a metabolic defect that is caused by a mutation in the enzyme methylenetetrahydrofolate reductase. This mutation results in a raised serum homocysteine. (5)

The US Public Health Service recommended in 1992 that all women who are capable of becoming pregnant should consume 0.4 mg of folic acid per day to reduce the risk of a pregnancy affected with spina bifida or anencephaly. In addition to folates from the normal diet, supplementation can prevent half to three-quarters of cases of these two birth defects. All women who are capable of becoming pregnant are targeted because folate is most effective in the early weeks of pregnancy before most women know they are pregnant. Since more than half of the pregnancies in the US are not planned, the majority of women would not have been taking supplements to prevent NTD. (2)

A Healthy People 2000 objective was added in 1995 to stress the importance of folic acid. The objective promotes reduction of NTDs through increased folate intake by women of childbearing age. (6) The Healthy People 2000 objectives hope to bring into the limelight certain public health issues of importance.

Although folic acid recommendations have been out for a few years, many women still do not know about this nutrient or its benefits. Therefore, knowledge of folic acid in the general, American public and also within subcultures and other cultures is important. Some subcultures have been studied, but one in particular that has not been investigated is the Amish population. Therefore, I wanted to investigate the knowledge of folic acid among Amish women.

Statement of the Problem

The following question will be studied:

1. Do Amish women have adequate nutrition knowledge of folic acid and the relationship of folic acid to NTD?

Need for the Study

The Amish are a unique subculture found in North America that purposely separate themselves from the general population on the basis of their religious beliefs. All aspects of their life are regulated by their culture. They have simple dress that does not bring attention to the individual. Most Amish use horse and buggy as their mode of transportation. The design and accessories of the buggy are even specified.

Most Amish do not use electricity or telephones. However, outside health care is utilized along with other professional occupations. (7) Amish do not receive an education above the eighth grade level. It is felt that this is enough to survive in their culture. (8)

Gender roles of the Amish are very set and definite. Few women work outside of the home and their main goal is to have a large family. Children are considered a gift from God and an economic asset. (7) Birthing centers, midwives, and home delivery are common choices for the delivery of Amish babies. (9) Amish women are expected to continue bearing children until menopause, often at the rate of one each year. (8)

The Amish are a rapidly expanding population with lower education and frequent pregnancies. These points make them an ideal culture to study concerning their knowledge of folic acid and its role in pregnancy.

Assumptions of Study

For the purpose of this research, the following assumptions were made:

1. The subjects were literate, and able to comprehend written instruments;
2. The subjects were willing to cooperate and provide honest and accurate responses to written questionnaires;
3. The survey accurately and reliably measured the subjects' knowledge on folic acid.

Limitations of the Study

For the purpose of this study, the following limitations were made:

1. The sample selection was limited to Amish women who attended the Twin Springs Medical Center or Swiss City Medical Center;
2. The sample was not representative of Amish women residing in the Midwest.

Definition of Terms

The following terms are defined as they will be used in the investigation.

1. ***Amish***: A strict sect of Mennonite followers of Jacob Ammann that settled in America.
2. ***Folic acid***: A water-soluble B vitamin with the scientific name pteroylmonoglutamic acid. The name folate may be used interchangeably.

Objective

The broad objective of this study was to determine the nutrition knowledge of folic acid among Amish women.

Hypothesis

The Amish women will have little to no nutrition knowledge on folic acid.

CHAPTER II

REVIEW OF LITERATURE

Folate

Hine published a commentary on what practitioners need to know about folic acid (10). The U.S. Food and Drug Administration (FDA) began fortification of enriched flour with 0.140 mg folic acid per 100 g of flour. Compliance was required by January 1, 1998. The FDA wanted to increase folate intake of women in their childbearing years while preventing excessive intake by other population groups. Also, health claims linking folate and lower incidence of NTD are permitted on food labels. Folate status has been found to help protect against mildly elevated blood homocysteine levels and cardiovascular disease. (10)

Folate status is affected by many variables. Lengthy cooking may destroy food folates because they are easily oxidized. Food fortification and supplements contain a form of folic acid that is easily absorbed which is absent in natural food folates. Natural food folates must be enacted upon by an enzyme before absorption can take place. Smoking increases the need for more folate. Other variables like alcohol consumption, some diseases, and drugs may also affect folate status. (10)

Some sources of dietary folate are orange juice, leafy green vegetables, and grain products. The trend for the U.S. consumer is that the major sources of folate in the diet are not necessarily the highest or best sources available. It might be easiest to stress eating these sources than to try to introduce new foods. (10)

Pertaining to labels, a rich source of folate is one containing at least 20% of the RDI. A good source is only 10%. The problem with these restrictions is some major

sources of folate in the American diet would not be able to have a health claim for example, orange juice fits into this category. (10)

The masking of vitamin B12 deficiency is a major concern for those involved with food fortification. The FDA decided 1 mg of folate would have to be consumed per day to risk masking a vitamin B12 deficiency. Folic acid supplements that are over-the-counter are even limited to 0.4 mg per tablet to reduce this same risk. More studies are needed to watch the long-term effects of high doses of folate. (10)

Increasing Folate

In a study completed by Daly et al, red cell folate levels in early pregnancy were found to be associated with a woman's risk of having a child with NTD. (11) Two strategies to raise folate levels were addressed. Eighty-four cases of NTDs and 266 controls from the Dublin, Ireland area from March 1986 to March 1990 were studied.

NTD risk was found to be associated with red cell folate levels in a continuous dose-response relationship. Changes in red cell folate levels are related to changes in risk. The enzyme methionine synthase appears to be linked to the red cell folate level. The high-risk strategy involved identifying individual women whose red cell folate are low, which puts them at high risk and then raising their levels to reduce their risk. This strategy would be costly to screen and treat. Screening involves a simple blood test and treatment would be through supplementation. It would change the risk for the individual substantially, but the effect on the total population of NTDs would be relatively small. On the other hand, the second strategy was to increase the red cell folate levels of all women before pregnancy. This was to be accomplished through food fortification with the population effect being large, but the change of risk for the individual small. The best

strategy was one that combined the two to complement each other. It was suggested that population measures be taken, along with screening by physicians, for women who are planning a pregnancy. (11)

In an editorial by Oakley et al, based on Dolyetal's article they stressed the urgent need to increase folic acid consumption (2). They evaluated Dolyetal's article in terms of the reality of food fortification that would be necessary to raise daily folic acid intake to the prescribed extra 0.4 mg per day in the population. By cereal grain fortification alone, it was not possible for all women to reach the desired levels. Some women do not consume cereal grain products, therefore either other foods would have to be fortified or vitamin supplements made available for them. (2)

Both food fortification and supplementation of folic acid should be stressed. Fortification should be at a level of 0.35 mg per 100 g of grain, which is not enough for women to meet the recommendation of 0.4 mg per day but could still highly improve the public health. Physicians should encourage their patients to supplement with folic acid. (2)

Davis et al completed a study dealing with the absorption of folic acid in women who have a history of pregnancy with neural tube defect (1). The study consisted of 10 women with a previous history of NTD and a 10 women control group who had normal pregnancy history from northwestern South Carolina. (1)

This study was designed to overcome previous studies that did not account for saturation before measuring absorption. It was found that absorption of supplemental or food fortified folic acid was not impaired in women who have a history of pregnancy with NTD. (1)

Werler and Louik completed a study to examine three approaches to achieving the public health recommendation of folic acid intake in women of childbearing age. (12) In the Boston and Philadelphia areas, a sample of 1136 mothers who gave birth to babies with major malformations between 1993 and 1995 were interviewed within 6 months of delivery. (12)

The three approaches consisted of daily use of folic acid supplements, consumption of folate-rich foods, and cereal grain fortification with folic acid. The fortification level was 0.14 mg/100 g of product. This applied to cereal grains including wheat, corn, and rice flours. Also, corn grits and meals, farina, rice, and macaroni and noodle products were included in the fortification. Although, breakfast cereals do not have specific regulations, they can contain a maximum of 0.40 mg of folic acid per serving. Studies have demonstrated that fortified breakfast cereals contain 0.1 mg of folic acid per serving. (12)

From the study pool, 71% of the women had not taken folic acid containing supplements daily before conception. However, the proportion decreased over the years of the study. Depending on the bioavailability of naturally occurring folates in the foods eaten, only about 8% to 21% of the women met the recommendations for folate just from dietary intake and these figures included fortification. Even with fortification, the daily intake of folic acid fell below the recommendations in a sizeable portion of the intended population. Therefore, women of childbearing age should be advised to take folic acid supplementation daily. With the study population, vitamin supplementation was found to be inversely related to age, education, and income. (12)

Folate Knowledge

A poll conducted in 1997 that focused on knowledge of folic acid in American women was compared to a similar one from 1995 in an article in JAMA. (13) More women were better informed about the benefits and were actually taking more folic acid than in 1995. The sample population consisted of 2,001 U.S. women between the ages of 18 and 45. (13)

Women who had heard or read about folic acid increased from 52% in 1995 to 66% in 1997. Of the women who had heard of the recommendations for folic acid, an increase of 7% was seen over the two years. The percentage of women who knew that folic acid helps prevent NTDs rose from 5% to 11%. Knowing that folic acid should be taken regularly before pregnancy increased from only 2% in 1995 to 5% in 1997. (13)

In both surveys, only half of the women who had heard of folic acid could name a good food source. Also, both surveys had similar response as to how the women had obtained their information about folic acid, but the percentage of women who named radio or television as their source of information doubled from 6% in 1995 to 14% in 1997. (13)

Thirty percent of women who were not pregnant at the time said they took a daily multivitamin that contained folic acid, which was a 5% increase. Women 25 years and younger were the least likely to take a vitamin supplement. More public awareness needs to be stemmed from education strategies to increase the knowledge of childbearing age women so they may receive the benefits of folic acid. Lag time was observed between knowledge gain and actual implementation of folic acid intake in women. (13)

Utilizing the Health Belief Model, Kloeblen looked at the knowledge of folate among low-income pregnant women. (6). A sample of 251 low-income, pregnant women from Atlanta, Georgia, who were mainly minorities, were involved in the study between March and May 1997. (6)

Seventy-eight percent of subjects were found to have unplanned pregnancies and did not take supplements preconceptionally. Those who supplemented did so after neural tube closure was about complete. The majority of women found out they were pregnant at about 7.5 weeks +/- 4.7 weeks which was after folate intake can influence NTD. (6)

Knowledge of folate was limited in that more than half of subjects had heard of folate, but only 26% could correctly define or describe this nutrient. In the same area, only 30% could name one food source of folate. Of those who had heard of it, 73% knew folate prevented birth defects, 46% correctly defined or described folate, 38% knew folate protected against NTDs, and 50% named a food that was a good source. Dietary evaluation concluded that all subjects should consume grain products daily. By doing this, approximately 77% of the subjects would achieve the recommendation from just fortified grain intake. About 45% were estimated to be consuming periconceptionally adequate folate from supplements. (6)

The Health Belief Model was found to be an adequate means of developing a foundation from which to construct educational materials directed at a specific population. Knowledge of folic acid has been increasing over the years, but the behaviors to follow the recommendations are even slower. Strategies that may be beneficial are nutrition education campaigns and easy access to inexpensive folate supplements. Also, folate interventions should be designed to meet the educational needs of specific high-risk

segments of the population. Intervention should be based on public health theory like the Health Belief Model. (6)

A study conducted by Perez-Escamilla et al. dealt with the knowledge of folic acid and NTDs among inner-city residents. (14) A sample of 471 inner-city residents from Hartford, Connecticut, who were primarily Latino women in their early 30s with at least one child, were involved in the study between January 1 and September 30, 1997. (14)

Fifty-six percent of the sample had less than a high school education with only 9% having more than a high school education. Seventy-two percent of respondents were on food stamps. Knowledge of folic acid and neural tube defects was low with only 17% of the sample ever hearing about spina bifida or neural tube defects and 11% identified folic acid as the nutrient capable of preventing these defects. Over 80% of respondents did not know good food sources of folic acid. Median intake of both fruits and non-starchy root vegetables was 0.4 times per day. (14)

The Amish

The Amish society was studied in an article by Donnermeyer (7). He wanted to introduce health care professionals to this society so that they may gain knowledge to help them effectively provide quality service to the population. The Amish are a subculture that is both separate yet connected to the general population. The total population is about 160,000 found in 21 states and one Canadian province. (7)

The Amish held specific religious beliefs to remain separate from the rest of the world. They follow Romans (12:2) and Corinthians II (6:14) and have continued their same beliefs throughout their 500-year history. The Anabaptist broke away from the

Catholic and Protestant groups in 1525 near the city of Zurich in Switzerland. It was over their beliefs about infant baptism and government sponsorship of religion. The Anabaptists believed in adult baptism, which is how they received their name that means rebaptized. Over the years, they were intensely persecuted by others. (7)

The Anabaptist also are known as Mennonites because Menno Simons, a former Catholic priest from the Netherlands, was essential in writing down many of the beliefs and practices of the new religion. In 1693, a more conservative group of Anabaptists broke away under the leadership of Jacob Ammann, a church elder. The Amish were named for Ammann. (7)

In 1737, the Amish first arrived in colonial America. They settled in Lancaster and Berks counties of Pennsylvania, but soon spread into other areas. Throughout their history, many distinctive orders or affiliations of the Amish have split off due to disagreements on issues like shunning, clothing, or adaptation to modern technology. Examples of different orders are the Old Order Amish, Schwartzentruber Amish, Andy Weaver Amish, New Order Amish, and others, too. The Amish are very diverse within these different sects. Each church district has its own set of rules to follow since there is no bureaucracy or hierarchy above the individual church bishops to enforce homogenization from the top. (7)

The Amish tend to live close together in the same area also called settlements which works well because they rely on face-to-face contact to worship and help each other in times of need. They mainly use horse and buggy for transportation and live in rural areas with farmland that has rolling hills that is better for horse farming, but settlements are still close enough to urban centers to receive needed services. (7)

The majority of the men work in farming, carpentry, or other manual labor jobs, but the proportion of Amish males in farming is decreasing due to the rapid population growth and limited available new farmland. A rapid growth in Amish owned businesses has been seen recently. The majority of women are homemakers and mothers. These occupations relate well to their culture because they are self-employed and children can work alongside their parents to learn the Amish ways and encourage them to stay with the faith when they become adults. (7)

The Amish still continue to worship like their ancestors. Church districts consist of only a few dozen families and number about 1,100 throughout the U.S. and Canada. Each is led by a bishop and nominated church leaders, which consist of a deacon and two ministers. There is no church building and services rotate from one house to the next of the church families. Communion is practiced twice a year, baptism is performed on adults, and shunning is utilized as punishment. (7)

Shunning is called Meidung (pronounced mide-ung). It only applies to baptized adults of the community and is often misunderstood by outsiders. Shunning usually only lasts a limited time and is rarely permanent except in the most conservative orders. If the accused join another Christian congregation, then the shunning is lifted. Shunning is often the last straw and other measures are attempted before they resort to it. The members of the church must agree before the leaders will enforce the punishment. Adultery and divorce are automatic cases for excommunication. (7)

Amish families are apt to be large with the average number of live births per family being over six, which makes the Amish a fast expanding culture. The population growth was paused from about immigration until the 20th century. It grew from about

5,000 in 1900 to 85,000 by 1979 and was up to 160,000 in 1997. Within the past 25 years, two in every three settlements have been founded and they range from Delaware to Montana to Texas to Ontario, Canada. (7)

Most Amish marry and divorce is very rare with the extended family remaining important in the Amish culture. Their dress is regulated and has plain colors and usually no buttons or zippers. They speak Pennsylvania Dutch among themselves and call others the English. (7)

In the Amish culture, the technology that is allowed, is closely maintained by the church. Little electricity, telephones, or automobiles are used by the Amish. The Amish church has reasoning behind the regulation and restriction of technology. Anything that might diminish the community and fellowship of the Amish is not allowed into the society unless absolutely necessary. Amish cannot own some items of technology, but can use them under certain circumstances therefore they still benefit through technology for important things without threatening their community. (7)

Folk remedies and home cures for ailments are still utilized by many Amish. They often wait until a condition is acute before going to a physician or medical facility, but they prefer local doctors and those who express a genuine care and respect for them. Few Amish are allowed to own medical insurance. (7)

The Amish mainly send their children to one room schoolhouses that are run by young unmarried Amish girls. Education only goes through the eighth grade and the Amish have fought legal battles with the United States government to be able to maintain this. In response to their lower level of education, Amish must go outside of their community to receive health care, legal, or other professional services. (7)

Amish life is ruled by the ordnung (pronounced ott-ning). It is the rules of prescription and proscription for living the Amish way, but they are not all written rules with much of the tradition being orally passed on from generation to generation. However, the ordnung is not unchanging. It must slightly adapt to modern society to insure the continuation of the society. The adult baptized members of a church district constantly communicate on issues that threaten their Amish way of life. (7)

Gelassenheit (pronounced gay las en hite) is the general guide by which Amish behave. It means yielding to a higher authority. The adults see themselves as shepherds leading the children to the Amish faith. Gelassenheit stresses not drawing attention to oneself as an individual and humility over pride. It directs everything from body language to use of technology to tone of voice when speaking. (7)

Health Risk Factors in Amish

In a study on the Amish by Fuchs et al, they performed a survey to assess the health risk factors. (14) A sample of 400 Amish and 773 non-Amish from the Holmes County, Ohio area completed the surveys. The Amish were contacted by a door-to-door interview using the Behavioral Risk Factor Survey developed by the U.S. Centers for Disease Control plus a few additional questions while the non-Amish were interviewed over the telephone. (14)

The male-female life expectancy was more comparable to each other in the Amish than in non-Amish population. In the Amish, the largest proportion were married. The Amish women and men were similar in proportion widowed while the non-Amish women were three times more likely to be widowed than men. (14)

Amish men were more likely to be self-employed mainly in agriculture. A significant difference was found between Amish women and non-Amish women because two-thirds of the Amish were homemakers, but only 27% of the non-Amish were. About 80% of Amish women were found to spend most of their time in households with no outside employment. A surprising finding was that around 60% of the Amish did not know or were unsure of their income. This factor could be genuine uncertainty or a reluctance to share personal income. (14)

The proportions of Amish women and men were lower than non-Amish in each age category on being told they had high blood pressure. Non-Amish were much more likely to report they were watching their weight or exercising to lower their high blood pressure. In one study, it has been found that the rise in blood pressure with age is much less pronounced in the Amish than in the non-Amish especially in the less assimilated orders. (14)

Obesity was more prevalent in the Amish population in many cases. Amish men 35 and above were more likely to be obese than non-Amish men and Amish women were more likely to be obese in every age category except 18-24. For both obese men and women, the non-Amish were much more significantly trying to lose weight than Amish. Of those who were attempting to lose weight, Amish were much less likely to be engaging in physical activity to achieve the weight loss. The greater prevalence of obesity among Amish women may have been due to the higher number of pregnancies for each woman. The Amish males may have demonstrated more obesity as they got older because they tend to be less active on their farms as their children take over some of the daily physical activities. (14)

The psychological well-being questions resulted in answers that were varied. Amish women were significantly more likely to express they felt depressed or low than non-Amish were likely. Both Amish women and men were significantly more likely to indicate they had problems carrying on their regular activities due to nervousness or anxiety. These findings may be due in part to the Amish being more honest than non-Amish on their reporting because they do not associate these emotions to be stigmatizing. Also, studies have shown that Amish tend to have less serious mental illness and disorders. (14)

Amish cultural beliefs have other positive health benefits associated with their way of life. The Amish demonstrated less alcohol or tobacco use than the general population especially for women. This may have been due to greater social control of women who are linked to the household and community. By limiting alcohol and tobacco use, the Amish have less prevalence of the negative outcomes that these are linked to like higher rates of mortality. (14)

The Amish were found to participate in vaccinations when they were provided at lower costs which reflected the frugal life style they live in. The same was seen with screening activities. The Amish are concerned about their health because they see their bodies as a "Temple of God" which helps them value prevention strategies. (14)

Health promotion and educational activities need to be designed to fit the target population. The Amish differ in their needs from that of the non-Amish population in many ways and also between different sects of the Amish order. Materials and interventions should be based on what the culture needs and permits. Planning should

include people from the target community to help insure participation and that no cultural beliefs are being violated. (14)

Although ample information is available about the Amish, little to no research has looked at the nutrition knowledge and dietary habits of the Amish population. Therefore, the objective of this research was to investigate nutrition knowledge of folic acid among Amish women.

CHAPTER III

METHODOLOGY

Sample

Permission was received from two medical centers to help recruit participants for this study. They agreed to hand out surveys to Amish women who were pregnant or planning to be pregnant. Both medical centers were located in areas with an Amish population that regularly utilized the centers. Permission from the Twin Springs Medical Center was received from Dr. Anita Showalter in Kidron, Ohio. Dr. Robert Judge provided permission for the Swiss City Medical Center to participate.

Criteria to participate were that all subjects must be Amish females who were pregnant or planning to become pregnant. All subjects read the informed consent form and provided verbal consent. The Institutional Review Board approved the study before any data collection began.

Seventy-five copies of both the informed consent form and three pages of the survey (see Appendix A) were mailed to the medical centers along with a self-addressed, postage paid envelope to return the completed surveys.

Study Design

The surveys were completed, collected, and returned to the investigators upon request. A self-addressed, postage paid envelope was initially included for this purpose.

The surveys were statistically analyzed for frequencies and percentages by a statistician.

Instrumentation

Before the start of the study, the survey was tested for validity by giving it to 5 Amish women who were not participants of the research. The surveys included questions regarding demographics, folic acid knowledge, vitamin supplementation, and information sources.

Data Analysis

Data was analyzed statistically using frequencies and percentages.

CHAPTER IV

RESULTS

Subjects

Forty-five Amish women who were pregnant or planning to become pregnant participated in the study over a three to four week time period. Thirty-six women were from Ohio and nine were from Indiana. All subjects were given an informed consent form upon visiting one of the two medical centers for health care services. The subjects were then free to fill out the survey or opt not to.

Table 1 represents the ages of the subjects who were involved in the study. As shown, 93% of the subjects were between the ages of 21 and 40, with 39% of them were in the 21-25 age category and another 30% were between 26-30 years. Looking at the education level of the subjects and their spouses (Table 2), all but 3 individuals had no more than an eighth grade education. Ninety-four percent of the women and 92% of the spouses had an eighth grade education. As shown on Table 3, 52% had 2 or fewer children.

Table 1: Age of Amish Women

Variable	Number (%)
20 or younger	1 (2.3%)
21-25	17 (38.6%)
26-30	13 (29.5%)
31-35	7 (15.9%)
36-40	4 (9.1%)
41 & older	2 (4.5%)

Table 2: Years of Formal Education for Amish Women and Their Spouses

Variable	Number (%)
Women 7th grade	1 (2.8%)
Women 8th grade	34 (94.4%)
Women 9th grade	1 (2.8%)
Spouse 7th grade	1 (2.7%)
Spouse 8th grade	34 (91.9%)
Spouse 9th grade	1 (2.7%)
Spouse 14th grade	1 (2.7%)

Table 3: Number of Children

Variable	Number (%)
0	6 (14.3%)
1	5 (11.9%)
2	11 (26.2%)
3	4 (9.5%)
4	7 (16.7%)
5	4 (9.5%)
6	1 (2.4%)
7	2 (4.8%)
8	1 (2.4%)
9	1 (2.4%)

When asked where they preferred to receive information about vitamins during pregnancy, 70% indicated their doctors while 45% preferred to get this information from their midwives (Table 4). A majority (62%) of Amish women had either heard, read, or taken folic acid (Table 5). Only a small number (n=17) indicated the opposite.

Table 4: Amish Women's Preference of Sources of Information About Vitamins During Pregnancy*

Variable	Number (%)
Doctor	31 (70.5%)
Pharmacist	3 (6.8%)
Women's Magazine	3 (6.8%)
Public Health Nurse	2 (4.5%)
Midwife	20 (45.5%)
Community	3 (6.8%)
Others	4 (9.1%)

*Subjects were allowed to choose more than one answer.

Table 5: Amish Women who have Heard, Read About, or Taken Folic Acid

Variable	Number (%)
Yes	28 (62.2%)
No	17 (37.8%)

Among women who had heard of folic acid, 54% had heard about this nutrient from family or friends and another 31% heard from their doctor (Table 6). Interestingly, 77% knew the benefit of this B-vitamin to the prevention of birth defects (Table 7). However, 4 subjects answered this question incorrectly. They attributed folic acid intake to reduce the risk of low birth weight, lung and bone development. When questioned about when was the best time to take folic acid, 53% of the women indicated that it had to be before pregnancy, while 47% indicated during pregnancy (Table 8).

Table 6: Sources of Information Where Amish Women Heard of Folic Acid*

Variable	Number (%)
Media	3 (11.5%)
Doctor/Health Provider	8 (30.8%)
Family/Friends	14 (53.8%)
Midwife	2 (7.7%)
Community	1 (3.8%)
Others	1 (3.8%)

*Subjects were allowed to choose more than one answer.

Table 7: Primary Benefit of Taking Folate on Pregnancy

Variable	Number (%)
Risk low birth weight	2 (11.8%)
Lung development	1 (5.9%)
Bone development	1 (5.9%)
Risk birth defects	13 (76.5%)

Table 8: Best Time to Start Taking Folate for Pregnancy

Variable	Number (%)
Before pregnancy	10 (52.6%)
During pregnancy	9 (47.4%)
After pregnancy	0 (0%)

When the Amish women were asked the number of times per week that they were taking prenatal vitamins, 78% indicated taking prenatal vitamins 7 times per week, but only 25% were taking folic acid supplements other than their prenatal vitamins (Table 9 & 10). Table 10 shows the results of the question about vitamin and mineral supplements taken in addition to prenatal vitamins.

Table 9: Number of Times/Week Subjects were Taking Prenatal Vitamins

Variable	Number (%)
0	3 (13.0%)
1	0 (0%)
2	0 (0%)
3	1 (4.3%)
4	1 (4.3%)
5	0 (0%)
6	0 (0%)
7	18 (78.3%)

Table 10: Vitamin/Mineral Supplementation Other than Prenatal Vitamin*

Variable	Number (%)
Iron	16 (57.1%)
Calcium	17 (60.7%)
Folic Acid	7 (25.0%)
Vitamin C	10 (35.7%)
Vitamin E	9 (32.1%)

*Subjects were allowed to choose more than one answer or no answer at all.

Nutrition knowledge of the food sources of folic acid was extremely low (Table 11). Thirty-two percent selected orange juice as a good source of folic acid. However

7% indicated that bread and beans were good sources of folic acid. Four percent thought organ meats (liver/kidney) were excellent source of folic acid. Unfortunately, 21% thought cabbage was a good source of folate. Table 12 shows the results of the number of Amish women who had taken folate during a previous pregnancy. Of the women who had heard about folic acid, only 41% had taken folate during a previous pregnancy.

Table 11: Foods that are a Good Source of Folate*

Variable	Number (%)
Orange/Orange Juice**	9 (32.1%)
Bread**	2 (7.1%)
Beans**	2 (7.1%)
Milk	2 (7.1%)
Liver/Kidney**	1 (3.6%)
Cucumber	2 (7.1%)
Grapes	3 (10.7%)
Cabbage	6 (21.4%)

*Subjects were allowed to choose more than one answer.
**Good food sources of folate.

Table 12: Amish Women who had Taken Folate During a Previous Pregnancy

Variable	Number (%)
Yes	12 (41.4%)
No	17 (58.6%)

Table 13 shows where the Amish women who were previously pregnant had received advice to about folate. Forty-four percent had started taking folate on the advice of family or friends. The last question asked about when the Amish women started taking folate for their current pregnancy (Table 14). Forty-three percent of the women had began taking folic acid for their current pregnancy when they were first diagnosed and another 43% started during the pregnancy, but not at the start. Only 14% had taken folic acid while trying to become pregnant.

Table 13: Sources of Advice to Amish Women to Start Taking Folate*

Variable	Number (%)
Doctor	4 (25.0%)
Nurse	1 (6.3%)
Media	2 (12.5%)
Family/Friends	7 (43.8%)
Midwife	2 (12.5%)
Community	1 (6.3%)
Did so on my own	4 (25.0%)
Others	1 (6.3%)

*Subjects were allowed to choose more than one answer.

Table 14: When the Amish Women Started Taking Folate for Current Pregnancy

Variable	Number (%)
Trying to become pregnant	2 (14.3%)
When pregnancy first realized	6 (42.9%)
During pregnancy, but not at the start	6 (42.9%)

CHAPTER V

DISCUSSION

Folic Acid Knowledge Between Amish and Other Populations

The purpose of this study was to determine the nutrition knowledge of folic acid among Amish women. Although research has shown that folate can help prevent NTD (1) folate should be taken at least four weeks before conception to be beneficial (3). Even though recommendations to take folic acid have been out for a few years many women still do not know about this nutrient or its benefits. (6) Therefore, knowledge of folic acid within this population is important. One subculture of women that was of interest were the Amish. Because of their conservative lifestyles with very traditional beliefs and practices (e.g. lower education, frequent pregnancies) this population needs to be targeted regarding the nutrition knowledge of folic acid. (8)

A survey was used to determine the nutrition knowledge of folic acid held by Amish women. Findings of the recent research were compared with other similar studies. In a study done on inner-city respondents who were mainly Latino women, their nutrition knowledge was also looked at using a survey. (14) The Latino study had 56% with less than a high school education compared to 97% of the Amish women in this current study. On the contrary, 77% of the Amish knew the benefit of folic acid on birth defects and only 11% of the Latino responded correctly. Knowledge of good food sources was much more comparable. Over 80% of the Latino study could not name a good food source of folic acid. (14) In the present research, only 32% selected orange juice/oranges as a good source of folic acid. Although breads, beans, and liver/kidney are good sources of folic

acid, as indicated in Table 11; a small percentage selected these foods as being excellent sources of folic acid.

Kloeblen was involved in a research study that looked at the knowledge of folate among low-income pregnant women who were mainly minorities (African Americans). (6) The minority study had a mean educational achievement grade of 11.7 +/- 1.9, but 100% of the Amish were ninth grade or below. Irrespective of educational levels, Kloeben's research and this pilot study indicate that the women who had heard of folic acid knew that it prevented birth defects. Seventy-three percent in the minority study and 77% in the Amish study answered that question correctly. Interestingly, 50% of the African American respondents were able to name a good food source of folic acid. (6)

Another survey that focused on nutrition knowledge of folic acid was completed on American women with comparable ages to that of this Amish population. (13) Among general American women, 66% had heard or read about folic acid compared to 62% of Amish sample. However, 53% of the Amish knew that folic acid should be taken before pregnancy, but only 5% of the general, American population. Unlike the Amish women (32%), more (50%) of the women in the general, American study could name a good food source of folic acid. (13)

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The investigator of this study feels that the Amish women had a higher level of knowledge about folic acid than suspected on account of their minimal education. As seen in the discussion, the Amish have higher levels of knowledge when compared to other groups with similar levels of education. The Amish value prevention strategies so they may keep themselves more informed than other subgroups. (14)

The Amish may have nutrition knowledge of folic acid, but they still need to implement their knowledge into their lifestyles more. Lack of implementation may be due to an ignorance as to how to use the knowledge. They may not have the understanding as to how to correlate the knowledge into practice, which requires a higher level of comprehension.

Recommendations

For future research with Amish women, the following recommendations are made. It would be beneficial to have a larger sample size from more areas of the country where the Amish populations would be found. It is also recommended that information regarding the conservativeness of the Amish population (e.g. Old Order Amish, New Order Amish, Schwartzentruber Amish, Andy Weaver Amish, etc.) be obtained. Often, the more conservative are reluctant to participate in health care practices. A study comparing the nutrition knowledge of folic acid between the different orders of the Amish population may also be beneficial.

To further validate this study, surveys should be performed in person by a trained investigator. In addition, 3-day dietary records should be collected to validate participants' dietary intakes of folic acid.

Another aspect of research that should follow is overall nutrition knowledge of the Amish population. Distribution of age related subgroups should be studied to see if age makes a difference in nutrition knowledge.

Lastly, research on the testing of the application of nutrition knowledge in Amish and other populations would be highly advantageous. Educational programs should be targeted to emphasize utilization of the nutrition knowledge into the daily lives of the Amish so that they would be informed as to how to use what they have learned. Programs of this nature would definitely be beneficial to educate nonprofessional participants in the utilization of folic acid.

Information for Participants

Research Title: "Nutrition Knowledge of Folic Acid in Amish Women who are Pregnant or Planning to be Pregnant."

The purpose of this study is to investigate the nutrition knowledge of folic acid in women who are pregnant or planning to be pregnant. As a subject, you will complete a survey that asks informational and nutritional related questions on folic acid. The survey will take 5 minutes of your time.

Your participation in this study is completely voluntary. Your name will not be used in any presentation of the data or results from the study and all data and results will be treated with strict confidentiality.

Your participation in this study will not only make a major contribution to scientific research but will also educate you on the role of folic acid. This information is intended to give you some impression of the procedures associated with this study.

For one's rights as a research subject, the following persons may be contacted; Ms. Sandra Smith, Coordinator of Academic Research and Sponsored Programs, Ball State University, Muncie, IN 47306, (765) 285-1600, or Dr. Sharon Paulson, Chairperson of the Institutional Review Board, Educational Psychology, Ball State University, Muncie, IN 47306, (765) 285-8500.

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Appendix B

RESEARCH ON AMISH WOMEN

1. What is your age?
   - i) ____ 20 or younger
   - ii) ____ 21 – 25
   - iii) ____ 26 – 30
   - iv) ____ 31 – 35
   - v) ____ 36 – 40
   - vi) ____ 41 and older

2. Circle the number below which corresponds to your total years of formal education.

|----------grammer & high school----------| |------college------| |-----post grad-----|
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

3. Circle the number below which corresponds to your spouse's total years of formal education.

|----------grammer & high school----------| |------college------| |-----post grad-----|
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+

4. How many children do you have?
   ___ 0 ___ 1 ___ 2 ___ 3 ___ 4 ___ 5 ___ 6 ___ 7 ___ 8 ___ 9 ___ 10+

5. Mark an X beside those you would prefer to go to if you wanted information about the benefits of taking vitamins with regard to pregnancy? (you may mark more than one)
   - i) ____ doctor
   - ii) ____ pharmacist
   - iii) ____ women's magazine
   - iv) ____ public health nurse
   - v) ____ midwife
   - vi) ____ community
   - vii) ____ others (please identify) _____

6. Have you ever heard about, read about, or taken folic acid or folate?
   ____ Yes ____ No

IF YOU ANSWERED NO TO THE LAST QUESTION, YOU ARE NOW FINISHED WITH THE SURVEY

Please turn over

7. Where did you hear about folic acid (folate)? (you may mark more than one)
   i) ____ media (newspapers, magazines, television, radio)
   ii) ____ doctor or health provider
   iii) ____ family/friends
   iv) ____ midwife
   v) ____ community
   vi) ____ others (please identify) _____

8. To the best of your knowledge, what is the primary benefit of taking folic acid (folate) on the outcome of your pregnancy? (please mark only one)
   i) ____ reduces risk of low birth weight
   ii) ____ promotes fetal lung development
   iii) ____ promotes fetal bone development
   iv) ____ reduces risk of certain birth defects
   v) ____ reduces risk of certain cancers
   vi) ____ minimizes the effects on the fetus of smoking/drinking during pregnancy

9. In relation to pregnancy, when do you think is the best time to start taking folic acid (folate)?
   i) ____ before pregnancy
   ii) ____ during pregnancy
   iii) ____ after pregnancy

10. How many times a week do you take prenatal vitamins?
    ____ none ____ 1 ____ 2 ____ 3 ____ 4 ____ 5 ____ 6 ____ 7

11. Place an X beside each of the following vitamin/mineral supplements you are taking in addition to your prenatal vitamins.
    i) ____ iron
    ii) ____ calcium
    iii) ____ folic acid (folate)
    iv) ____ vitamin C
    v) ____ vitamin E

12. Mark an X beside each of the following foods which you think is a good source of folic acid.
    i) ____ orange/orange juice
    ii) ____ bread
    iii) ____ pork
    iv) ____ potato
    v) ____ beans
    vi) ____ milk
    vii) ____ liver/kidney
    viii) ____ cucumber
    ix) ____ grapes
    x) ____ cabbage

**IF THIS IS YOUR FIRST PREGNANCY,
YOU ARE NOW FINISHED WITH THE SURVEY**

13. Have you taken folic acid (folate) during any period of a previous pregnancy?
____ Yes ____No

**IF YOU ANSWERED NO TO THE LAST QUESTION,
YOU ARE NOW FINISHED WITH THE SURVEY**

14. What were your important sources of advice to start taking folic acid? (you may mark more than one)
i) ____ doctor
ii) ____ nurse
iii) ____ pharmacist
iv) ____ media
v) ____ family/friends
vi) ____ midwife
vii) ____ community
viii) ____ did so on my own
ix) ____ others (please identify) _____

19. When did you start taking folic acid during your most recent pregnancy?
i) ____ while trying to become pregnant
ii) ____ when pregnancy was first realized or suspected
iii) ____ during pregnancy but not at start of pregnancy
iv) ____ after delivery

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